

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
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Gaithersburg, Maryland 20899-2300

SRM Number: 931g
MSDS Number: 931g
SRM Name: Liquid Absorbance Standard for
Ultraviolet and Visible Spectrophotometry

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Description: This Standard Reference Material (SRM) is intended for use as a primary for critical evaluation of daily working standards used in spectrophotometry and for use as an accuracy check of the photometric scale of spectrophotometers. One unit of SRM 931g consists of twelve 10 mL sealed glass ampoules of solution. Three ampoules contain 10 mL of dilute (1 %) perchloric acid solution each.

Substance: Dilute Perchloric Acid solution.

Other Designations:

Perchloric Acid (dioxonium perchlorate; perchloric acid solution; perchloric acid; HClO₄)

2. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 3 Fire = 0 Reactivity = 0

NOTE: The health and physical hazard information provided in this MSDS are for perchloric acid. No physical or chemical data are listed for this dilute perchloric acid solution. The actual effects of the solution may differ from the individual components.

Major Health Hazards: Perchloric acid is corrosive and can cause severe or fatal burns if inhaled, swallowed, or absorbed through the skin. Severity of the damage depends on the concentration and duration of exposure.

Physical Hazards: There are no known physical hazards associated with this material.

Potential Health Effects

Inhalation: Inhalation of perchloric acid can damage the mucous membranes and upper respiratory tract. Short term exposure may cause irritation and inflammation of the upper respiratory tract, coughing, choking, sore throat, shortness of breath, headache, dizziness, and nausea. Long term exposure to acid fumes may cause damage to teeth, bronchial irritation, chronic cough, bronchial pneumonia, and gastrointestinal disturbances.

Skin Contact: Perchloric acid can cause severe skin burns. Effects may be delayed. Severity of the damage depends on the concentration and duration of exposure.

Eye Contact: Perchloric acid can cause severe eye burns, permanent eye damage, or blindness.

Ingestion: Ingestion of this material is unlikely under normal conditions of use. If ingested, perchloric acid can cause severe burns and damage to the gastrointestinal tract.

Medical Conditions Aggravated by Exposure: This material may aggravate pre-existing eye disorders, respiratory disorders, skin disorders, and allergies.

Listed as a Carcinogen/Potential Carcinogen:

Component:	Yes	No
Perchloric Acid		
In the National Toxicology Program (NTP) Report on Carcinogens	_____	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	_____	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	_____	<u> X </u>

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

NOTE: SRM 931g contains nine 10 mL solutions each containing trace amounts of cobalt and nickel. The concentration of these elements is below the reportable limit: hazardous components (1 %); carcinogens (0.1 %), required by OSHA, 29 CFR 1910.1200 (g) (2) (i) (C) (1), for MSDS information. The physical and chemical data provided are for perchloric acid. The actual behavior of the solution may differ from the pure component.

Component ^(a)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Perchloric Acid	7601-90-3	231-512-4	1.0

^(a)This material has not been tested as a whole. Hazardous components 1 % or greater; carcinogens 0.1 % or greater are listed in compliance with OSHA 29 CFR 1910.1200(g)(2)(i)(C)(1).

Components: Perchloric Acid (7 % Solution)

EC Classification: Xi,
EC Risk (R No.): R36/38
EC Safety (S No.): 23, 26, 36, 45

EC Classification Risk/Safety Phrases: Refer to Section 15, "Regulatory Information".

NOTE: The EC classifications for Perchloric acid vary based on the concentration of the acid in the solution. The information provided above is for a 1.0 % perchloric acid solution, the concentration in this SRM.

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

Skin Contact: Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Seek medical attention, if needed.

Eye Contact: Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Contact a poison control center immediately for instructions. Give water to rinse out mouth. Never give liquids to a person with reduced awareness or becoming unconscious. If vomiting occurs, keep head lower than hips to prevent aspiration. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard.

Extinguishing Media: Regular dry chemical, carbon dioxide, water, regular foam.

Fire Fighting: Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point: Not applicable.

Autoignition Temp.: Not applicable.

Flammability Limits in Air

Upper Explosive Limits (UEL): Not applicable.

Lower Explosive Limits (LEL): Not applicable.

Products of Combustion: Thermal decomposition may release hazardous or toxic gases (see Section 10 "Stability and Reactivity").

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Do not touch spilled material. Notify safety personnel of spills. Absorb with sand or other inert material. Place in suitable container for proper disposal. Neutralize the residual with a dilute solution of sodium bicarbonate. Place the neutralized material into a separate container suitable for proper disposal.

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection". Ampoules may break or shatter.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: There are no exposure limits listed for this perchloric acid solution or for the pure components.

Ventilation: Use local exhaust ventilation system. Ensure compliance with applicable exposure limits. Refer to the ACGIH document, *Industrial Ventilation, a Manual of Recommended Practices*.

Respirator: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29 CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye Protection: Wear chemical safety goggles. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Perchloric Acid
Appearance and Odor	colorless liquid, hygroscopic odor not available.
Molar Mass	100.46 g/mol
Molecular Formula	HClO ₄
Specific Gravity (water = 1)	1.6
Water Solubility	soluble
Boiling Point	115 °C(239 °F)
pH	acidic

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for the dilute perchloric acid solution are not available.

10. STABILITY AND REACTIVITY

Stability: Stable Unstable

Stable at normal temperatures and pressure.

Conditions to Avoid: Contact with combustible or incompatible materials.

Incompatible Materials: Acids, combustible materials, metals, oxidizing materials, metal oxides, halo carbons, halogens, metals salts and bases.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition will produce acid halides, oxides of chlorine, and other miscellaneous decomposition products.

Hazardous Polymerization: Will Occur Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data

Mixture: Perchloric acid
No toxicity data listed.

Component: Perchloric Acid
Rat, Oral LD₅₀: 1100 mg/kg

Health Effects (Acute and Chronic): See Section 2, "Hazards Identification" for potential health effects.

Target Organ(s):

Component: Perchloric Acid
Skin, eyes, and respiratory tract.

Mutagen/Teratogen:

No data listed.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: No ecotoxicity data listed for perchloric acid.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Corrosive liquid, n.o.s. (contains perchloric acid); N1760; Hazard Class 8; Packing Group II; Excepted Quantity E2.

15. REGULATORY INFORMATION

U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Not regulated.

OSHA Process Safety (29 CFR 1910.119): 5000 lbs TPQ (concentration \geq 60 % by weight).

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH: Yes.

CHRONIC HEALTH: No.

FIRE: No.

REACTIVE: Yes.

PRESSURE: No.

STATE REGULATIONS

California Proposition 65: Not regulated.

CANADIAN REGULATIONS

WHMIS Information: Not provided for this material.

EUROPEAN REGULATIONS

Components: Perchloric Acid (7 %)

EC Classification (assigned)

Xi: Irritant

EC Risk Phrases

R36/38 - Irritating to eyes and skin.

EC Safety Phrases

S23 - Do not breathe gas, fumes, vapor, or spray.

S26 - In case of contact with eyes rinse immediately with plenty of water and seek medical advice.

S36 - Wear suitable protective clothing.

S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Perchloric Acid listed.

TSCA 12(b)

Export Notification: Not listed.

16. OTHER INFORMATION

Sources: ChemAdvisor, Inc., MSDS *Perchloric Acid, 60 %*, 10 June 2011.

European Chemical Substance Information System (ESIS), *Perchloric Acid... %*, CAS No. 7601-90-3; available at <http://ecb.jrc.ec.europa.eu/esis/> (accessed Sep 2011).

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.